APPLICATION OF SIMULATORS DURING TRAINING

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ABSTRACT

In industrial training, in the process of which professional skills are formed, an important role belongs to the means of training. It is known that the activities associated with the machine labor processes are much more difficult to perform than the one performed with hand tools. Since it is necessary to train such activities on machines, which is associated with certain difficulties, and in some cases even with a risk to life, there is an urgent need to transfer training to artificially created, real-world-like conditions, i.e. imitating a machine or labor process on it and at the same time it is safe. Currently, in the preparation of competitive personnel, the importance of simulators is very great due to the fact that simulators activate the educational process, facilitate and contribute to the transformation of theoretical knowledge into practical skills acquired by students in special course of study. Also, the article by means of simulators highlights the possibilities of reflecting the conditions of labor production in the process of education.

Keywords: Education, practice, practical skills, labor, adaptation, simulator, model, real model, technical model, design.

The problem of ensuring close cooperation between the production industry and vocational education, improving the quality of vocational education, continuous improvement of educational processes aimed at training personnel who are able to actively and effectively participate in the processes of reforming a stable build-up and modernization of vocational education remains of high priority today. Methods of practical training of future specialists in professional work, in particular, practical and laboratory works, organization and conduction of qualifying practices are studied by researchers such as Hopfner G.D., Khaydarov B., Goleva G., Shosalimov J., Avazov Sh., Muslimov N., Khodzhabayev A., Skakun B., Olimov Q [1; 2; 3; 4; 5; 7].

Teaching and production facilities are considered as basic teaching materials during practical training, which include job training workshops, various machine tools and equipment, as well as additional auxiliary devices. Such conditions create, firstly, real opportunities for planning all parts of the learning process (providing educational information, learning it, performing learning activities, analyzing the nature and qualities of this activity, corrective actions on it, etc.), secondly, for their optimal functioning, thirdly, for the management of cognitive activity. Namely, the availability of opportunities for the management of cognitive activity ensures the effectiveness of the formation of professional knowledge and skills. The practice of vocational training shows that, at present, educational activity in many cases is still abstracted from real labor activity, i.e. it is organized under conditions that do not model it, but at best, with the use of appropriate tools. This does not allow the learner to provide educational information reflecting the whole diversity of work, and to fully implement the learning content [3, 4].

The contradiction between the increasing complexity of content and the goals of vocational training on the one hand, the achievement by traditional means and methods on the other,

contributed to the wide development of various teaching devices and the emergence of new types of training, primarily computer and simulator.

A didactic analysis of simulator training and development trends confirms its great practical capabilities and advantages, which are not yet fully utilized. One advantage is that the educational information, on the basis of which students perform educational activities, is dynamic, depending on the stage of the lesson and its goals, it can vary in the sequence and speed of presentation.

In training workshops, students form practical skills and skills for the production of certain products, they increase the practical knowledge of the types of services provided to the population, provided in the vocational education program, for accepting production orders and fulfilling them. Here, students, along with the fact that they master the skills to keep their jobs clean and tidy, get acquainted with the equipment, machines, tools used in the future, the principles of their work, learn various working methods, production culture, realize the value of time, and get to know with the rules of occupational safety and compliance with these rules [5].

Simulators make up a special group of technical means. A simulator (imitator) is a technical tool for learning, opportunities are created with its help to reflect the conditions of production (labor) in the training and production process.

Simulators help students improve the formation of skills such as managing technological processes in production, identifying and eliminating problems at technical facilities, and performing complex operations. Today, simulators are widely used in training employees for such complex industries as ship operators, car drivers, train operators, power and chemical process equipment operators.

For example, when explaining to students the principles of operation of some production devices, it may not be possible to show them by breaking them into parts. Showing, directly in real conditions, the process of operating such complex equipment as an airplane, a ship, a helicopter, along with the fact that they can deliver great difficulties and can still threaten the lives and safety of participants and those around them.

There are the following advantages of simulators:

- the educational process simplifies the transition of students from the theory of special disciplines to the mastery of practical skills;
- activity of students brings to the conditions of production and provides protection from malfunctions, accidents and other hazards that may occur;
- creates students the opportunity to re-do complex processes that cannot be applied in the process of real production, choose any time or situation related to production, try to change the pace of the working mode;
- try to create (imitate) difficult working conditions, including creating various emergency situations that cannot be implemented in the present working conditions of students;
- modeling or prediction, until complete elimination of various problems;
- development of students of such techniques, which are considered to be the true factor of self-government when working with special tools equipped with various simulators, which are characterized by feedback.

To maximize the pedagogical effectiveness of training, it is necessary to fulfill another equally important requirement: the information provided should, according to its logic, correspond to the content of production activities. Such structure and logic of educational information make it possible to ensure the formation of precisely those professional ranks, abilities and skills that are necessary for carrying out activities in real conditions [6].

Obviously, the higher the degree of modeling (similarity) of the object or conditions of labor activity, the greater the possibilities of providing various educational information, and therefore the most complete implementation of the training content. However, there are several contradictions.

First, in some cases there are specific difficulties in modeling of working conditions. On many simulators, no matter how modern they are, it is very difficult to model all the diversity of labor operations, especially with a high degree of similarity.

The second contradiction lies in the fact that the observance of the principle of the highest degree of similarity in modeling the production environment does not yet provide the broad didactic possibilities of the simulator as a means of training.

When using simulator at all stages of training, in most cases, only educational information is used that is carried by the model of the object or labor process, i.e. the one that the simulator itself gives. Educational information that has a motivational or problematic character, necessary for the activation of mental activity, is used little or not at all. Such information is not developed in the form of special didactic materials, and neither means nor methods of its provision are provided in the simulators, as a rule. As a result, the process of simulator training turns out to be "lean" and is not much different from training at real work sites [9].

The third contradiction is an economic one; it consists in a directly proportional dependence of the simulator on the level of modeling; the higher the modeling level, the higher the degree of model similarity to real objects of labor or working conditions, the more expensive the simulator.

The simulators cannot ensure the achievement of all the ultimate goals of the learner's activities, but they are intended to be a tactile stage, ensuring an effective transition from theory to practice in a production environment.

With respect to such simulators, the learning process will be considered effective if:

- the range of knowledge, skills and abilities, formed on the simulator, is the largest and covers exactly those kinds of actions that are necessary to perform this work activity;
- the formation of knowledge, skills and abbreviations reduces the time compared with other types of training;
- generated knowledge, skills and abilities have a greater reliability coefficient, have mobility, variability, ability to transfer, correspond to the actions that are necessary to perform this activity in real conditions [10].

Prerequisites for achieving high pedagogical efficiency are:

- from the methodological point of view, close integration of various sciences, both technical (repair of roads and bridges, repair and maintenance of road transport, etc.) and humanitarian (pedagogy, psychology, etc.);
- the ability to use the results and achievements of these sciences in the organization of training, which helps to create the necessary didactic conditions;

- from the standpoint of the theory of management, the possibility of organization of training to create conditions for the management of the cognitive activity of students, while the management of cognitive activity must take into account two interrelated aspects such as the psychological-didactic and cybernetic;
- the psychological-didactic aspect of cognitive activity management involves consideration of the psychological conditions and mechanisms of digestion of knowledge, formation of skills and abilities in order to create various didactic materials and build an effective teaching methodology;
- the cybernetic aspect is associated with the analysis and creation of feedforward and feedback in the learning process to determine the best ways to provide educational information and monitor the success of the training;
- from the didactic point of view - the possibility of a simultaneous combination of various forms, methods, means for presenting educational information, carrying out educational activities, monitoring its success and timely applying corrective actions;
- from the methodological point of view - the possibility of preliminary development of teaching methods as a kind of technology for organizing the activities of the student and teacher with the subsequent implementation of this methodology in the learning process.

One of the important factors in the creation of simulators is the reduction of materials, which are studied by breaking into parts in conditions close to the work activity of students, that is, work on situations in which you need to practice more. Therefore, without completely modeling the environment or the operation of production for educational purposes, as well as labor activity, a situation, necessary for the practical activity of students, is designed. If the implementation of model operations is close to real conditions, the efficiency of the training tool will be high [8].

Training simulators with regard to the use and structure are divided into three groups:

- simulators that design the composition and tasks of technical objects intended for the development of methods for operation and maintaining real objects. These include aviation, automobile simulators, as well as simulators designing technological devices for chemical production and other simulators. These simulators, in their volume and size, are close to the processes of the present production, based on the implementation of exercises and operations related to the direct production process. Moreover, they are divided into simulators with reduced size (models).
- simulators, modeling structures and functions of technical objects, are created on the basis of physical and mathematical principles on the basis of electronic computing equipment. When we say a physical model, we understand an object, a process, a situation that differs in volume, weight and has no secondary features, similar to the originals, and has a number of physical features. For example, a car simulator simulates the driver's seat and the “movement” on the road (the driving road and the car), computer simulators are created based on the principles of mathematical design, as well as computer simulators based on computers.
- simulators designed for the formation of skills associated with certain intellectual activities of students. Such simulators include simulators - imitators, designed to show the malfunction of various instruments and installations, as well as to identify and isolate defects in the production process. When creating the aforementioned simulators, the design task is not posed when copying the structure and function of technical objects. The main purpose of the use of these simulators is to teach students the rules for the implementation of certain mental actions, algorithms, identifying the appearance of defective goods.

The main difference between the various simulators is revealed by how they are adapted to facilitate the formation of certain skills of action. Usually, they design the structure and functions of technical objects. The selected skills are formed based on the use of not very complex equipment and devices.

For example, simulators adapted for cutting metals or imparting various ornaments or indended for manual exercises with hand saws and knives.

When organizing exercises on simulators, it is very important that students familiarize themselves with special visual languages, methods of information coding, various indicators, letter fonts, intervals, parameters, lighting colors that are needed when using the display. This is necessary for students who master various professions, for example, useful in training operators of the chemical and petroleum industry, which are considered rare. On simulators designed to train such specialists, operations are carried out ranging from all technological regimes to simulating emergency situations. Circumstances associated with malfunctions in normal operating modes are expressed with the help of signals in the form of special color signs or siren sounds. Students, on the basis of signals transmitted by instrumentation, are required to take appropriate operational actions and measures regarding bringing the operating mode to a normal state manually or using keys in the control panel. It is even typical for simulators to demonstrate the mechanisms of equipment operation in the form of an automatic mode. The principles of operation of such mechanisms, students can observe in the monitor of special instrumentation or through signals received in the form of sound or color. In addition, students' actions are recorded using self-recording devices for the purpose of subsequent monitoring and analysis.

Another important advantage of simulators is the ability to reflect at different speeds of all production processes and operations, that is, in the interval of different times. The thing is that all real chemical and petrochemical production processes are slower than learning processes, and with the help of training simulators, this process can be accelerated, which allows students to accelerate the process of learning material and save study time. Acceleration of the model of technological processes allows to increase its parameters and degree of visibility.

ABSTRACT

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